

## CLAIMS

What is claimed is:

1. A method for specifying animation by a computer, comprising the steps of:  
loading a first image into an animation author for display on a display screen;  
entering an animation object into said animation author;  
entering into said animation author an animation path for said animation  
5 object from a starting position to an end position; and  
entering into said animation author a playback speed for playback of said  
animation.
2. A method for specifying animation as recited in claim 1, comprising  
repeating foregoing steps for each animation object of said animation.
3. A method for specifying animation as recited in claim 1, comprising the step  
of saving said animation as a Toolbook™ book.
4. A method for specifying animation as recited in claim 1, comprising the step  
of saving said animation as an SGML (Standardized Generalized Markup Language)  
file.
5. A method for specifying animation as recited in claim 1, comprising the  
steps of:  
calculating a new orientation for said animation object as a function of  
position of said animation object on said animation path; and

5           orienting said animation object to said new orientation during said animation.

6.       A method for specifying animation as recited in claim 5, wherein said step of calculating a new orientation comprises:

          representing said animation path as a series of sampling points;

5           at each given sampling point, calculating a deviation by comparing coordinates of said given sampling point with coordinates of the next sampling point of said series;

          comparing said deviation with a predetermined limit; and

          recalculating said orientation whenever said deviation exceeds said predetermined limit.

7.       A method for specifying animation as recited in claim 1, comprising the steps of:

          forming a boundary box for said animation object;

5           calculating a new orientation for said boundary box as a function of position of said animation object on said animation path; and

          orienting said boundary box to said new orientation during said animation.

8.       A method for specifying animation as recited in claim 7, wherein said step of calculating a new orientation comprises:

          representing said animation path as a series of sampling points;

5           at each given sampling point, calculating a deviation by comparing coordinates of said given sampling point with coordinates of the next sampling point of said series;

          comparing said deviation with a predetermined limit; and

recalculating said orientation whenever said deviation exceeds said predetermined limit.

9. A method for specifying animation as recited in claim 4, wherein said step of calculating a new orientation comprises:

- representing said animation path as a series of sampling points;
- at each given sampling point, calculating a deviation by comparing
- 5 coordinates of said given sampling point with coordinates of said next point;
- comparing said deviation with a predetermined limit; and
- recalculating said orientation whenever said deviation exceeds said predetermined limit.

10. A method for specifying animation as recited in claim 1, comprising the steps of:

- specifying said animation to play in one of:
  - (a) a normal mode; and
  - 5 (b) a scheduling mode.

11. A method for specifying animation as recited in claim 10, wherein said step of specifying said animation to play in said normal mode comprises:

- specifying a playing pace for said animation for causing said animation to play at its own specified pace substantially independently of any other animation
- 5 objects.

12. A method for specifying animation as recited in claim 10, wherein said step of specifying said animation to play in said scheduling mode comprises:

specifying a playing pace for said animation for causing said animation to play at a synchronized pace based on a user specification.

13. A method for specifying animation as recited in claim 1, wherein said steps of loading a first image and of entering an animation object into said animation author comprise a step of using Toolbook™ for implementing said steps.

14. A method for specifying animation as recited in claim 10, comprising a step of specifying said animation for playing on a stand-alone animation player.

15. A method for specifying animation as recited in claim 13, comprising a step of specifying said animation for inclusion by another Toolbook™ book.

16. A method for specifying animation as recited in claim 1, wherein said step of entering an animation object comprises:

entering said animation object into an animation array.

17. A method for specifying animation as recited in claim 16, wherein said step of entering an animation object comprises:

storing properties associated with said animation object in said animation array.

18. A method for specifying animation as recited in claim 16, wherein said step of entering an animation object comprises:

modifying, when necessary, said animation object in said animation array.

19. A method for specifying animation as recited in claim 1, wherein said step of entering an animation object comprises:

entering said animation object into an animation array in an enhanced data structure provided by Toolbook™.

20. A method for specifying animation illustration as recited in claim 19, wherein said step of entering an animation object comprises:

storing properties associated with said animation object in said animation array.

21. A method for specifying animation as recited in claim 19, wherein said step of entering an animation object comprises:

modifying, when necessary, said animation object in said animation array.

22. A method for specifying animation as recited in claim 1, wherein said step of entering an animation object comprises:

entering first and second paths for composing a pipe; and  
specifying a fill-in color for said pipe.

23. A method for specifying animation as recited in claim 22, wherein said step of entering into said animation author an animation path comprises:

specifying said starting position and said end position as a beginning point and an end point for said pipe, respectively.

24. A method for specifying animation as recited in claim 23, wherein said animation is specified such that said animation starts at beginning point and ends at said end point for said pipe.

25. A method for specifying animation as recited in claim 1, comprising:  
specifying a default condition for said animation object to have a pre-condition and a post-condition;  
specifying a default condition for said animation object such that said  
5 pre-condition and a post-condition are null initially; and  
specifying a default condition for said animation object to have statuses of  
READY, RUN, and DONE.
26. A method for specifying animation as recited in claim 25, comprising:  
scheduling said animation by an algorithm that checks each entry of an  
object in said animation array and starts said object when its pre-condition is  
satisfied and signals said object in its post-condition.
27. A method for specifying animation, comprising the steps of:  
interactively entering an animation object into an animation authoring tool;  
entering an animation path for said object; and  
specifying animation of said object with orientation as a function of said  
5 animation path.
28. A method for specifying animation, comprising the steps of:  
interactively entering an animation object comprising a pipe into an  
animation authoring tool;  
specifying a fill color for said pipe; and

- 5 specifying said fill color to start filling said pipe at a beginning point thereof  
at the start of said animation and to fill said pipe to an ending point thereof at the  
end of said animation.
29. A method for specifying animation, comprising the steps of:
- interactively entering a plurality of animation objects into an animation array  
in an animation authoring tool;
  - storing properties associated with each of said animation objects in said  
5 animation array, including pre-conditions and post-conditions thereof; and
  - scheduling said animation by an algorithm that checks each entry of an  
object of said plurality in said animation array and starts said object when its pre-  
condition is satisfied and signals said object in its post-condition.
30. Apparatus comprising a computer means for providing animation of an  
animation object by the functions including:
- interactively entering an animation object into an animation authoring tool;
  - entering an animation path for said object;
  - 5 specifying animation of said object with orientation as a function of said  
animation path;
  - selectively entering a pipe animation object into an animation authoring tool;
  - specifying a fill color for said pipe;
  - specifying said fill color to start filling said pipe at a beginning point thereof  
10 at the start of said animation and to fill said pipe to an ending point thereof at the  
end of said animation;
  - selectively entering a plurality of animation objects into an animation array  
in an animation authoring tool;

storing properties associated with each of said animation objects in said  
15 animation array, including pre-conditions and post-conditions thereof; and

scheduling said animation by an algorithm that checks each entry of an  
object of said plurality in said animation array and starts said object when its pre-  
condition is satisfied and signals said object in its post-condition.

31. Apparatus comprising a computer means for providing animation of an  
animation object including:

means for interactively entering an animation object into an animation  
authoring tool;

5 means for entering an animation path for said object;

means for specifying animation of said object with orientation as a function  
of said animation path;

means for selectively entering a pipe animation object into an animation  
authoring tool;

10 means for specifying a fill color for said pipe;

means for specifying said fill color to start filling said pipe at a beginning  
point thereof at the start of said animation and to fill said pipe to an ending point  
thereof at the end of said animation;

means for selectively entering a plurality of animation objects into an  
15 animation array in an animation authoring tool;

means for storing properties associated with each of said animation objects in  
said animation array, including pre-conditions and post-conditions thereof; and

means for scheduling said animation by an algorithm that checks each entry  
of an object of said plurality in said animation array and starts said object when its  
20 pre-condition is satisfied and signals said object in its post-condition.



32. Apparatus comprising a computer means for specifying animation, comprising:

means for loading a first image into an animation author for display on a display screen;

5 means for entering an animation object into said animation author;

means for entering into said animation author an animation path for said animation object from a starting position to an end position; and

means for entering into said animation author a playback speed for playback of said animation.

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